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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/769,763	02/03/2004	Makoto Totani	01-503-TB	8901
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POSZ LAW GROUP, PLC 12040 SOUTH LAKES DRIVE SUITE 101 RESTON, VA 20191			EXAMINER PATEL, ISHWARBHAI B	
			ART UNIT 2841	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/769,763

Applicant(s)

TOTANI ET AL.

Examiner

Ishwar (I. B.) Patel

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 March 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) 9,10,17,18 and 22-28 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 12 and 13 is/are allowed.
- 6) ☒ Claim(s) 1-8,11, 14-16 and 19-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 02/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election of specie I, claims 1-8, 11-16 and 19-21 in the reply filed on March 22, 2007 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Priority

2. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been received and placed of record in the file.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-5, 11, 14, 15 and 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schoenthaler (US Patent No. 5,165,984) in view of Higuchi (US Patent No. 6,831,236).

Regarding claim 1, Schoenthaler in figure 1 and 2 discloses a circuit board having a flat plate shaped first board part (12) and a flat plate shaped second board part

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(22 including layer 33) disposed stacked on a partial region of this first board part (see figure), said circuit board characterized in that said first board part and said second board part each comprise a substrate formed in a flat plate shape, a plurality of interconnection patterns arranged inside said substrate so as to form a plurality of layers in its thickness direction (see figure 2), and a plurality of interlayer connection parts (29) disposed inside said substrate for connecting interconnection patterns belonging to different layers, a plurality of first interconnection patterns are disposed on said stacked region of said first board part, a plurality of second interconnection patterns are disposed on said stacked region of said second board part so as to form pairs with said plurality of first interconnection patterns (see figure 2, interconnection patterns on both the first and second circuit board), and between the pairs of said first interconnection patterns and said second interconnection patterns, interboard connection parts are formed from a connection material (connection material with conductive particles 32, column 4, line 9-22).

Schoenthaler does not explicitly disclose at least one of the substrate of said first board part and the substrate of said second board part is made of a thermoplastic resin and said first board part and said second board part are joined at their stacked regions by the thermoplastic resin being melted and then rehardened. Schoenthaler discloses a printed circuit board made of conventional material including polyimide (column 2, line 60-63). Higuchi discloses a printed circuit board using thermoplastic polyimide material (column 12, 50-60).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of applicant's invention to provide the board of Schoenthaler, first board, second board or both of the boards, made of thermoplastic material, as taught by Higuchi, in order to have desired insulating / mechanical properties.

Further, it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960).

Regarding the limitations "said first board part and said second board part are joined at their stacked regions by the thermoplastic resin being melted and then rehardened," it is a process limitation in the product claim. Such a process limitation defines the claimed invention over the prior art to the degree that it defines the product itself. A process limitation cannot serve to patentably distinguish the product over the prior art, in the case that the product is same as, or obvious over the prior art. See Product-by-Process in MPEP § 2113 and 2173.05(p) and *In re Thorpe*, 777 F.2d 695, 227 USPQ 964, 966 (Fed. Cir. 1985). The modified board of Schoenthaler discloses the structure. Therefore, Schoenthaler meets the limitations.

Regarding claim 14, Schoenthaler in figure 1 and 2 discloses circuit board connection structure for connecting, a first circuit board (22 including a layer 33) to a second circuit board (12) serving as a mother board, characterized in that said first circuit board has a multilayer structure and interconnection layers are stacked alternately (see figure 2), and to electrically connect adjacent interconnection layers

together an interlayer connection material (29) is disposed in said insulating layers, in an insulating layer constituting a connection face of said first circuit board to be connected to said second circuit board, via holes reaching the inner interconnection layers are formed, and these via holes are filled with a connection material (connection material with conductive particles 32, column 4, line 9-22), said second circuit board has a multilayer structure wherein insulating layers and interconnection layers are stacked alternately and an interlayer connection material for electrically connecting adjacent interconnection layers together is disposed in said insulating layers (see figure 2), at least lands serving as connection terminals are formed on a connection face of said second circuit board (see figure 2, land on the upper surface), and inner interconnection layers are used for interconnecting to those lands (see figure 2), and said first circuit board is connected to said second circuit board by said connection material of the first circuit board being electrically connected to the lands of said second circuit board and the insulating layer constituting the connection face of said first circuit board being adhered to the connection face of said second circuit board (see figure 2).

Schoenthaler does not explicitly disclose using thermoplastic resin for the first or the second circuit board and the first and second circuit board are welded by thermal welding.

Schoenthaler discloses a printed circuit board made of conventional material including polyimide (column 2, line 60-63). Higuchi discloses a printed circuit board using thermoplastic polyimide material (column 12, 50-60).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of applicant's invention to provide the board of Schoenthaler, first board, second board or both of the boards, made of thermoplastic material, as taught by Higuchi, in order to have desired insulating / mechanical properties.

Further, it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960).

Regarding the limitations "said first board part and said second board part are joined by thermal welding," it is a process limitation in the product claim. Such a process limitation defines the claimed invention over the prior art to the degree that it defines the product itself. A process limitation cannot serve to patentably distinguish the product over the prior art, in the case that the product is same as, or obvious over the prior art. See Product-by-Process in MPEP § 2113 and 2173.05(p) and *In re Thorpe*, 777 F.2d 695, 227 USPQ 964, 966 (Fed. Cir. 1985). The modified board of Schoenthaler discloses the structure. Therefore, Schoenthaler meets the limitations.

Regarding claim 2, Schoenthaler further discloses that a part of said second board part is stacked on said first board part (see figure 2).

Regarding claim 3, Schoenthaler further discloses said second board part is more pliable than said first board part (because of presence of flexible layer 31).

Regarding claim 4, Schoenthaler further discloses said first board part and the substrate of said second board part are each made of a thermoplastic resin (as applied to claim 1 above).

Regarding claim 5, Schoenthaler further discloses the substrate of said first board part and the substrate of said second board part are made of an identical thermoplastic resin (as applied to claim 1 above).

Regarding claim 11, Schoenthaler further discloses said first and second interconnection patterns are arranged so as to form at least two rows (see figure 2, two pads shown in the cross section connecting the boards).

Regarding claim 15, Schoenthaler discloses all the features of the claimed invention as applied to claim 14 above but does not explicitly disclose that when the insulating layers of said second circuit board are made from a thermoplastic resin, as the thermoplastic resin constituting the insulating layers of the first board, a thermoplastic resin material having a lower melting point than the thermoplastic resin constituting the insulating layers of said second circuit board is used. However, the melting point of the resin can be changed by the adding the additives. Further, by keeping the melting point of the resin of both the board different layers of both the board will not melt together. If both the layer metal together, there will misalignment of the pads/patterns. Therefore, it would have been obvious to a person of ordinary skill in the

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art at the time of applicant's invention to provide the modified board of Schoenthaler with the thermoplastic resin constituting the insulating layers of the first board, a thermoplastic resin material having a lower melting point than the thermoplastic resin constituting the insulating layers of said second circuit board is used, in order to avoid misalignment of the pads /traces.

Regarding claim 19, Schoenthaler further discloses that said lands are arranged two-dimensionally on the connection face of said second circuit board (see connection face in figure 2).

Regarding claim 20, Schoenthaler discloses all the features of the claimed invention as applied to claim 14 above but does not explicitly disclose that a surface roughening treatment is carried out on at least one of the connection faces of said first circuit board and said second circuit board, to increase bonding strength. However, roughening the surface of either insulating material or conductive material is old and well known in the art to increase the adhesive strength of the surfaces to have better bonding. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of applicant's invention to provide the modified board of Schoenthaler with a surface roughening treatment is carried out on at least one of the connection faces of said first circuit board and said second circuit board, in order to increase the adhesive strength of the surfaces to have better bonding.

Regarding claim 21, Schoenthaler discloses all the features of the claimed invention as applied to claim 20 above but does not disclose said surface roughening treatment is carried out by irradiating the connection face with ultraviolet (UV) light. However, how the surface roughening treatment is carried out is a process limitation in the product claim. Such a process limitation defines the claimed invention over the prior art to the degree that it defines the product itself. A process limitation cannot serve to patentably distinguish the product over the prior art, in the case that the product is same as, or obvious over the prior art. See Product-by-Process in MPEP § 2113 and 2173.05(p) and *In re Thorpe*, 777 F.2d 695, 227 USPQ 964, 966 (Fed. Cir. 1985). The modified board of Schoenthaler discloses the structure. Therefore, Schoenthaler meets the limitations.

5. Claims 6-8 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over the modified board of Schoenthaler as applied to claims 1 and 14 above, and further in view of Jones (US Patent No. 6,593,534) and Kawakita (US Patent No. 5,914,358).

Regarding claim 6, the modified board of Schoenthaler discloses all the features of the claimed invention as applied to claim 1 above but does not disclose said first board part and said second board part, said interlayer connection parts of the board part having a thermoplastic resin as its substrate and said interboard connection parts are made from the same connection material, as recited in claim 6, or said connection material includes tin and silver as main components, as recited in claim 7.

Schoenthaler discloses two different interconnect materials. However, using the same material for the both the interconnection will reduce the material inventory and resulting cost. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of application to provide modified board of Schoenthaler with interconnection material made from the same material, in order to have the board at lower cost.

Regarding claim 7, the modified board of Schoenthaler discloses all the features of the claimed invention as applied to claim 6 but does not disclose the interconnection material comprise tin and silver. However, the use of interconnection material with tin and silver as main component is old and known in the art.

Jones discloses a wiring board with conductive paste having tin and silver (claims 8 and 44).

Kawakita discloses a conductive paste for via holes having tin and silver (claim 3).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of applicant's invention to provide the modified board of Schoenthaler with the interconnection material having tin and silver as taught by Jones and Kawakita, as is old and known in the art.

Further, it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960).

Regarding claims 8, the modified board of Schoenthaler discloses said first board part and said second board part, the interboard connection parts belong to the board part having a thermoplastic resin as its substrate as any of the board can be made of thermoplastic resin as applied to claim 1 above.

Regarding claim 16, the modified board of Schoenthaler discloses all the features of the claimed invention as applied to claim 14 but does not disclose said connection material includes at least a tin component and a metal component with a higher melting point than the tin component, and is electrically connected to the lands of said second circuit board by the tin component diffusing into the lands. However, the use of interconnection material with tin and silver as main component is old and known in the art.

Jones discloses a wiring board with conductive paste having tin and silver (claims 8 and 44).

Kawakita discloses a conductive paste for via holes having tin and silver (claim 3).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of applicant's invention to provide the modified board of Schoenthaler with the interconnection material having tin and silver as taught by Jones and Kawakita, as is old and known in the art.

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Further, it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960).

Allowable Subject Matter

6. Claims 12 and 13 are allowed.
7. The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record taken alone or in combination does not teach the limitation recited in claim 12 in combination with other claimed limitations of the base claim 1.

Claim 13 depends upon claim 12 and is allowable for the same reason.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Stopperan (US Patent No. 5,428,190) in figure 2 discloses a connection of a flexible circuit board with a rigid board.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ishwar (I. B.) Patel whose telephone number is (571) 272 1933. The examiner can normally be reached on M-F (8:30 - 5:00).

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dean Reichard can be reached on (571) 272 1984. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

ibp
June 11, 2007


Ishwar (I. B.) Patel
Primary Examiner